

SELF DEPLOYING MAGNIFIER FOR A PORTABLE COMPUTER DISPLAY SCREEN

FIELD OF THE INVENTION

The invention relates to portable computer display screens and in particular to a magnifier for a portable computer display screen.

BACKGROUND OF THE INVENTION AND RELATION TO THE PRIOR ART

In the development of computers, particularly of the types known in the art as laptop or notebooks efforts have been directed to providing as much computational capability as possible in as small and as light weight a package. The most efficient and physically rugged universal package that has evolved in the art is one in which the display screen portion is hinged on the portion of the keyboard away from the user; so that it can be positioned essentially vertical with respect to the keyboard when in use and can be folded down over the keyboard when not in use. With such a structure the area of the display screen is limited by the area dimensions of the overall package so that efficient use of every portion of the display screen will be taking on increasing importance.

Around the periphery of the display screen there is a border that takes up some of the area. Efforts to minimize the area occupied by the border around the display screen are somewhat limited in flexibility by the many stringent considerations associated with the liquid crystal display (LCD) technology employed in the display screens in these types of computers.

A developing problem in the portable computer art is that progress in display screens of the LCD type is approaching the point where the size of a quality display screen can become greater than the size usually considered for a portable computer. It will be of advantage in this art to be able to take advantage of size progress as it becomes available.

SUMMARY OF THE INVENTION

The invention reduces dimensional constraints on a portable computer by making the size of the apparent image of the display screen of the portable computer larger than the real size. The invention positions a flat optical magnifier such as a lens of the fresnel type in an optically enhancing position between the operator of the portable computer and the display screen so that the image at the computer operator side of the lens is greater than that present on the display screen. A mechanism is provided for a notebook type portable computer that is passive to a user, folds into the case when the display screen closes over the keyboard and positions a fresnel lens, coplanar with the display screen, when the notebook computer is opened.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the magnifier for a display screen of the invention mounted in a notebook, type computer.

FIG. 2 is side view of a fresnel lens type planar magnification member.

FIG. 3 is a larger scale perspective view illustrating relative positioning of the magnifier and display screen.

FIG. 4 is a schematic side view of the parts and their relative positioning for the magnifier mechanism.

FIG. 5 is a rear perspective view of the magnifier mounting mechanism for a portable computer display screen.

FIG. 6 is a rear perspective view of the magnifier mounting mechanism for a portable computer display screen with the mechanism in the fully collapsed position.

FIG. 7 is a schematic side view of the magnifier mounting mechanism for a portable computer display screen illustrating the relative positions of the pin, slots link and springs in the open position.

FIGS. 8-12 are side views illustrating progressive positions of the magnifier mounting mechanism from completely closed to beyond fully open; wherein:

FIG. 8 illustrates the fit of the collapsed mounting mechanism and lens within the cover of the notebook computer.

FIG. 9 illustrates the mounting mechanism and lens position when the cover is opened to about 45 degrees.

FIG. 10 illustrates the mounting mechanism and lens position when the cover is opened to about 75 degrees.

FIG. 11 illustrates the mounting mechanism and lens deployment when the cover is opened to about 84 degrees.

FIG. 12 illustrates the mounting mechanism and lens deployment with coplanarity when the cover is further fully opened to about 105 degrees.

DESCRIPTION OF THE INVENTION

The invention reduces dimensional constraints on a portable computer by optically making the size of an apparent image of the display screen of the portable computer different than the real size. The ability to have a different apparent display screen image provided by the invention relaxes display technology constraints affecting packaging of the portable computer. The invention description uses as an illustration the providing of a larger apparent image to avoid a reduction in available image area that is the result of a border region around the periphery needed for liquid crystal display technology.

In the invention a relatively flat magnifying member such as a relatively flat lens of the fresnel type is retained in a coplanar relationship with the surface of a planar display screen at an optical magnification distance from the display screen in the viewing path between the computer operator and the display screen. The optical magnification increases the size of the image on the display screen to a larger image apparent to the computer operator.

Referring to FIG. 11 the invention is illustrated as applied to a notebook computer 1 having a liquid crystal display screen 2 mounted in a cover 3 that is hinged at 4 on a keyboard 5 base. The liquid crystal display technology requires that there be a border region 6 surrounding the edges of the display screen 2 that occupies a significant portion of the available display area.

In accordance with the invention a magnifying member 7 is provided that is supported and retained by a frame 8 in a coplanar relationship with the surface of the display screen 2 at an optical magnification distance in the viewing path between the computer operator when facing the display screen 2 across the keyboard base 5, when the display screen 2 is positioned essentially vertical with respect to the keyboard base 5.

A mechanism is provided, labelled generally as element 9, and which will be described in detail in later figures, for positioning and maintaining the lens 7 and frame 8 images of the display formed by the magnifier lens 7 and frame 8 combination, that is seen by the computer operator can be, depending on the optical distance from the display screen 2, at least as large as the full area of the display screen 2 including the border 6 and may be larger. The optical